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(54) A PORTABLE CARD FOR SYSTEMS FOR PROCESSING ELECTRICAL SIGNALS AND A METHOD OF MANUFACTURING SUCH A CARD

(71) We, COMPAGNIE INTERNATIONALE POUR L'INFORMATIQUE CII-HONEYWELL BULL, a French Body Corporate, of 94 Avenue Gambetta, Paris (20), France, do hereby declare the invention, for which we pray that a patent may be granted to us, and the method by which it is to be performed, to be particularly described in and by the following statement:—

This invention relates to portable cards for systems for processing signals, and to a method of manufacturing such cards.

In most fields where an article is able to give a person private access to a system, this article is more and more frequently formed by a portable card. Such is the case with credit cards, for example, which have been in use for some twenty years and are now widespread.

Recently, the International Standards Organisation laid down rules for the dimensional characteristics of credit cards (ISO/DIS standard 2894). Standard cards are to be in the shape of a rectangle 85.72 mm by 55.98 mm and 0.762 mm thick. The alphanumeric characters which are intended for example to indicate the name and address of the person to whom the card belongs may be embossed formations whose height relative to one of the faces of the card should not exceed approximately 0.5 mm.

In the usual present-day cards, the information other than these alpha-numeric characters which is intended to give the cardholder access to a system for processing electrical signals is contained solely on prerecorded magnetic strips or bands which are attached to the card. Although what is contained on the bands may be adequate in certain applications, for other applications on the other hand, such as credit cards for example, it would be of great advantage to expand the information and indeed to incorporate in the card processing circuits which are capable of dialoguing with the signal processing system and which may possibly incorporate a memory. With such circuits credit cards could, in particular, perform all the requisite debit and/or credit operations in conjunction with the processing system and could record the results of these operations.

A number of trials have already been carried out along these lines in which attempts were made to incorporate an integrated circuit device in the card. However, problems arise for such an application to credit cards. The small thickness (0.762 mm) called for by the international standard still has to be sufficient to accommodate an integrated circuit device capable of performing the aforementioned operations, whilst at the same time the card has to retain a certain amount of flexibility without jeopardising the operation of the device.

There already exist a number of embodimetns of credit card incorporating integrated circuits. In one of these, the capsule containing the integrated circuits is connected to an array of conductors formed on a rectangular sheet of given length, the conductors terminating in contact areas which extend across part of the width of the sheet. A second sheet, of the same thickness as the capsule, contains an opening of the same length and breadth as the capsule but is not so long as the first sheet so as to leave the aforesaid contact areas exposed. This second sheet is applied to the first sheet so as to enclose the capsule. Finally a third sheet, of the same length and breadth as the second sheet, covers the second sheet and the capsule.

A drawback of this method of producing a credit card is that it involves three sheets of different configurations which have to be correctly superimposed and then bonded or welded. Also, so that the card will meet the standard mentioned above, the total thickness of the three sheets must not exceed 0.762 mm and the sheets thus have to be thin, making them difficult to handle, whilst the capsule has to be very thin and special techniques have to be used for the bonding or welding.

In another known method, the card is

produced from only two sheets. One of the faces of the first sheet is provided with an array of conductors which terminate in an equal number of external contact areas and the integrated circuit device is applied to this first sheet. The second sheet is arranged on top of it, but so that the card will encapsulate the said device, the two sheets are made of a material which softens at high temperature and thus, by being heated to this temperature, the two sheets are welded together with the device contained within them. This type of assembly thus calls for the use of two sheets made of a material having closely defined characteristics and then for controlled welding to take place at a high temperature, which might affect the condition of the device.

The present invention has for an object to substantially reduce or overcome all these drawbacks.

Accordingly from a first aspect the present invention consists in an information card comprising: a sheet having a predetermined surface area and a predetermined maximum thickness; an electronic assembly comprising a substrate having a surface area and a thickness smaller than said predetermined surface area and said predetermined maximum thickness of said sheet, respectively, and an electronic device for processing electrical signals carried on at least one major surface of said substrate, said electronic device having a plurality of terminals on a predetermined major surface area and an array of conductors which extend from said terminals toward terminal areas adjacent the peripheral portion of said substrate and which are connected with respective terminal areas; said sheet including a cavity of an area substantially greater than said predetermined major surface area of said electronic device for said substrate with said electronic device and said array of conductors, said cavity including a chamber for said device; said substrate being disposed against one face of said sheet and said card having aperture means adjacent said chamber for access to said respective terminal areas.

Thus, a card according to the invention may consist of only a single sheet which has an open or closed cavity in which the device may be positioned. The fact that the device and its array of conductors are already in place on a substrate is an advantage both for the manufacturing process and its cost. Also, one of the features of the present invention is that it may take advantage of the depth permitted for the reference characters (0.5 mm) formed by embossing by having the integrated circuit device inserted in a cavitv which can itself be formed by the same embossing operation as the reference characters in a part of the card where these characters are permitted to appear, or which can be encapsulated in a medium whose total thickness is equivalent to the standard thickness of the card (0.762 mm) plus the height of the characters (0.48 mm approx).

From a second aspect the present invention consists in a method of providing a card as set forth above, comprising providing a series of sheets each having a cavity; providing a series of circuit assemblies each including a substrate, an array of conductors on the substrate and at least a signal processing device connected to said conductors; inserting each of said device in said cavity of each of said sheets; and attaching each of said assemblies to the corresponding one of said sheets.

The method is thus simple. It employs only proven techniques. For example, each said substrate may originate from one and the same strip which carries a series of conductor arrays provided with theird corresponding integrated circuit devices. In addition, this substrate, which for the most part will occupy only a small area in comparison with the total area of the card, may be easily and effectively welded by known high frequency welding techniques. It will also be seen that conventional bonding methods are equally advantageous.

In order that the present invention will be more readily understood, various embodimetns of cards according to the invention will now be described by way of example and with reference to the accompanying drawings, in which:

Fig. 1 is a separated perspective view of a first embodiment of card;

Fig. 2 is a cross-section of the card taken on line II—II of Fig. 1;

Fig. 3 is a cross-section of a second embodiment of card;

Fig. 4 is a cross-section of a third embodiment of card;

Fig. 5 is a view from below of the card shown in Fig. 4 with the cover 50 removed;

Figs. 6 and 7 are cross-sections of fourth and fifth embodiments respectively of a card according to the invention;

Fig. 8*a* is a cross-section of a card according to the invention at the region where the external contact terminals of the signal processing device incorporated in the card are situated;

Fig. 8*b* is a view of part of the substrate in an arrangement as in Fig. 8*a*;

Figs. 9*a* and 9*b* are views similar to Figs. 8*a* and 8*b* respectively illustrating a modified arrangement of contact terminal according to the invention;

Fig. 10 is a cross-section of another modified embodiment of contact terminal; and

Fig. 11 is a schematic illustration of an apparatus for putting into practice a method of producing a card according to the invention.

The embodiment considered in the following description is a standard credit card. Because of the above-mentioned restrictions imposed by standardisation, it is an excellent example for bringing out the features and advantages of the present invention.

Reference will first be made to Figs. 1 and 2. In these Figures, an embodiment of a card 10 according to the invention is formed by a rectangular sheet 12 which meets the above-mentioned international standard, i.e. it is 85.72 mm long, 53.98 mm wide and 0.762 mm thick and the material of which it is made is laminated PVC (polyvinyl chloride) or PVCA (polyvinyl chloride acetate), or a material which has equivalent or superior working characteristics and is suitable for embossing.

In accordance with the standard, a part 14*a* of the card contained between one of its long sides and a boundary 15 parallel thereto, which is represented by a broken line in Fig. 1, is set aside to carry reference data, such as the name and address of the cardholder for example. This reference data may be alpha-numeric characters formed by embossing, such as the reference characters 16 which are shown in Figs. 1 and 2. The reference data may also be written on a thin element, made of paper for example, which is bonded to part 14*a* of the surface of the card 10, such as the element 18 shown in Fig. 1. In any case, the standard requires that the protuberant reference characters 16 and the bonded-on elements 18 should not exceed a height of approximately 0.5 mm from the upper face 12*a* of the card 10 on which the reference data is to appear. The permitted height of the characters is thus substantially equal to two thirds of the thickness of the sheet 12.

The sheet 12 is provided with a cavity 20 which, in the present embodiment, is a hole passing through the sheet. This hole is shaped to receive a device 22 for processing electrical signals. This device is connected to an array 24 of conductors which are provided with respective terminal areas 26.

The device 22 and the array 24 rest on one and the same substrate 28 which is of relatively smaller thickness than the sheet 12 forming the card and of relatively smaller area than this sheet. As an example, the assembly forming the element 30, which comprises the device 22, the array 24 and the substrate 28, may be of the type described in British Patent Specifications Nos. 148.322, 1,523,225 and 1,444,406.

Fig. 2 shows that the hole 20 opens into a shallow depression 32 foromed in the lower face 12*b* of the card. The geometric shape of the depression 32 corresponds to that of the substrate 28 but it is slightly larger in area. Its depth is so calculated that the substrate fits into the depression with one of its surfaces flush with face 12*b*.

In addition, cut-outs 34 are formed in the card at the regions where the terminal areas 26 of the conductors of the array 24 are situated when the substrate is in place in the card. In the present embodiment, the cut-outs are holes which pass through the sheet 12. These cut-outs are designed so that electrodes external to the card (not illustrated in Fig. 2) can come into electrical contact wih the terminal areas 26 on element 30.

In the embodiment illustrated in Fig. 2, the element 30 is attached to the sheet 12 by means of an electrically insulating filling material 36 which fills the hole as as shown in Fig. 2. This material is substantially flush with surface 12a in the case shown in Fig. 2 but it is possible in accordance with a feature of the invention, for the material to rise to the height permitted for the embossed formations 16. This is an advantageous possibility due to the fact that it enables devices 22 of large dimensions to be used whilst still keeping within the prescribed thickness of the card.

It should also be mentioned that the substrate in Fig. 2 must in this case be made of a relatively stiff material. As a modification, a cover (not shown) made of a stiffer material than the substrate could be used under the conditions illustrated in Fig. 4. Without the cover, the substrate 28 is bonded or welded to sheet 12.

Another fundamental feature resides in the fact that the device may advantageously be situated in a corner of the card, where any torsional stresses on the card, which is made of a relatively stiff material, are at a lower level than are exerted on the central part of the card. This advantage arises from the facts that the substrate only occupies a relatively small proportion of the card and that the terminal contacts are directly accessible to the electrodes, through the cut-outs 34, with the result that the conductors do not have to extend through the card and thus make it vulnerable to any torsion or bending.

Another characteristic according of the embodiment being described lies in the compatibility of processing by the device 22 with processing by other means such as magnetic bands or strips which can be applied in an area 14*b* provided for by the international standard. This area is a part of card 10 complementary to part 14*a* and is bounded by the broken line 15 which is marked out longitudinally on the card shown in Fig. 1. In accordance with existing practice there is shown at 38 such a magnetic band, which is generally joined to the lower face 12*b* of the card. In the example shown in Fig. 1, it can be seen that neither the device 22 nor the conductors in array 24 can interfere with

the zone intended for information recorded on the magnetic band.

Fig. 3 shows a modified embodiment of card according to the invention in which the element 30 for the processing device 22 is situated on face 12*a* of the card 10 rather than on the opposite face, as in the case of Fig. 2. This arrangement has several advantages over that which has just been described. In view of the permitted height which is available above face 12*a* of the card 10 under the provisions of the international standard, it is no longer necessary to form a depression such as the depression 32 shown in Fig. 2 and it is even possible for a cover 40, which is formed for example from a stiffer material than that which constitutes substrate 28 of element 30, to cover the whole assembly and to protect it more satisfactorily. The result is easier construction and better protection. In addition, it will be noted that the cut-outs 34 provided for electrical connections external to the card open onto the lower face 12*b* of the card. This in way affects the accessibility of the device 22 to the external electrical signal processing system with which the card is intended to communicate.

Possibly, a plug 42 may close the hole 20 on that face which is opposite to the face on which the element 30 is arranged. Such a plug could of course have been used in the case of the card shown in Fig. 2, the embodiments illustrated being considered merely as non-limiting examples.

It should also be noted that, although not shown so that the drawings remain clear, the cover 40 is welded or bonded to the card 10.

In the embodiment shown in Fig. 4, the cavity 20 is no longer a hole but an embossed formation 44 of the sheet 12 forming the card 10. The height of this embossed formation satisfies the standard, that is to say is at most equal to the height of the embossed formations 16 (0.5 mm approximately). Since this height represents approximately two-thirds of the thickness of the card, the additional room afforded by this embossed formation is far from negligible and offers many advantages. The device 22 is accommodated in the cavity 46 created by the embossed formation 44, whilst a first inset step 48 is provided to hold the substrate 28 of element 30. As in the case of Fig. 3, a cover 50 equivalent to the cover 40 in Fig. 3 may likewise be provided to stiffen the assembly.

An element 30 similar to that illustrated in Figs. 1 to 3 could be used, the consequence of which would be to cause the cut-outs 34 to open onto face 12*a* of the card. However, Fig. 4 illustrates another method of construction which may be adopted. In the case shown in Fig. 4, the device 22 and the array 24 of conductors are no longer both arranged on the same face of the substrate as is the case in Figs. 1 to 3, but are now arranged one on either side of the substrate, as is more clearly shown in Fig. 5. Because of this, it is the cover 50 which contains the contact cut-outs 34. However, to prevent matter such as dust or other very fine debris from collecting in cut-outs 34 and interfering with the electrical connection which provides the link between the device 22 and the processing system to which it is intended to be connected, these cut-outs may be filled with an electrically conductive material 52. This material may in particular be a lead-tin alloy or a conductive polymer for example.

Fig. 5 is a view from below of the card illustrated in Fig. 4, with the cover 50 removed. In this embodiment the substrate of the element 30 contains a rectangular central opening 54 into which the conductors of array 24 extend. The respective output contacts of the electrical or electronic circuits 56 incorporated in device 22 are positioned against the extended portions of these conductors. The arrangement shown in Figs. 1 to 3 differs from the present one in that there is no opening 54 and in that the combination formed by device 22 and array 24 is arranged on one and the same side of the substrate, the device being attached mechanically to the said substrate by the face which carries the circuits 56, or by its opposite face, by some means other than the electrical connections of the device. The advantage offered by the element 30 in the cards shown in Figs. 2 and 3 lies in its simple construction and improved reliability, which can be further increased by applying over the surface of the circuits 56 of device 22 a substance which cannot be removed from the device without impairing the operation of circuits 56. This is a sure mans of preventing fraud. This substance is shown at 58 in Figs. 2 and 4, for example, as a cross-hatched area situated immediately below device 22.

In the context of what has just been described, Fig. 6 shows a modified embodiment which employs a device 22 which is attached to array 24 by the face which carries the electrical or elecronic circuits. This being the case, the conductors in array 24 have to be bent so as to reach up to the level of the upper face of the device, where the processing circuits are situated. Such being the case, the device and the conductor array are both on the same side of the substrate 28. Also present in the card of Fig. 6 is once again the substance 58 which cannot be removed from the device without impairing the operation of the circuits. An optional embedding material enclosing the device 22 is shown at 60, as it also is in the case of all the other Figures.

A new feature also becomes apparent in

the case of the card of Fig. 6, namely that it is not now composed of a single sheet but instead of two sheets 62 and 64. As can be seen, the element 30 is inserted between these two sheets, the sheet 62 having previously been embossed. In manufacture, the two sheets 62 and 64 are bonded or welded together.

Fig. 7 shows yet another embodiment according to the invention. This card again uses only a single sheet 12 which is merely perforated to form the cut-outs 34 for the contacts. An element 30 as shown in Fig. 5 is placed against face 12*a* of the element. A cap 66 covers the device and the substrate. For this purpose, the cap is slightly embossed in such a way that, once welded to sheet 12, the thickness of the card at the point where the device is situated will at most be equal to the thickness at the point where the embossed formations 16 are situated.

All the embodiments which have just been described are of course merely illustrations of the various possibilities offered by an arrangement according to the invention. It is clear that combinations thereof also fall within the scope of the invention as defined in the following claims.

Means are also provided which ensure a good eletcrical connection between the device 22 of the card and the system which is required to co-operate with the card Figs. 8 to 10 illustrate various different means of providing this assurance.

In the arrangement in Figs. 8*a* and 8*b*, one and the same conductor 68 from the array 24 associated with device 22 cooperates with two contact cut-outs 34*a* and 34*b* which face a wide contact area 26. Thus, two electrodes 70*a* and 70*b* are required to test the contact between each conductor 68 and the processing system (not shown) with which the card is associated. A source 72 connected to the said electrodes 70*a* and 70*b* applies a predetermined voltage across these two electrodes. If the contact is satisfactory, predetermined current should flow through the two cut-outs 34*a* and 34*b* and the terminal area 26.

The arrangement shown in Figs. 9*a* and 9*b* makes it possible for poor contacts which may occur in the card to be detected in a more satisfactory fashion. In this case, each conductor 68 in the array 24 is split into two conductors 68*a* and 68*b* which communicate, via their terminal areas 26*a* and 26*b*, with respective cut-outs 34*a* and 34*b* formed in the card 10. At the device 22, the external terminals of the electrical or electronic circuits 56 are contacts 74 which are themselves split into terminals 74*a* and 74*b*, to which conductors 68*a* and 68*b* respectively correspond. By applying a voltage across the conductors from the voltage source 72 via the electrodes 70*a* and 70*b* and the cut-outs 34*a* and 34*b*, a current which should exceed a certain predetermined level should flow along a path consisting of terminal area 36*a*, conductor 68*a*, contact 74*a*, the connection between contact 74*a* and contact 74*b*, contact 74*b*, conductors 68*b*, terminal area 26*b*, and cut-out 34*b*. In this way, it is made certain that all the connections to device 22 are good.

Fig. 10 shows another embodiment in which each conductor 68 ends in a terminal area 26 which is carried through the substrate 28 by means of an opening 76 therein so that there are two terminal areas 26*a* and 26*b* one on each of the two faces of the substrate. Two cut-outs 34*a* and 34*b* are connected to areas 26*a* and 26*b* respectively and thus, by applying a predetermined voltage to electrodes 70*a* and 70*b*, a current higher than a given level should flow if good contact is being made.

Fig. 11 is a highly diagrammatic view of an apparatus which may be used to produce a card according to the invention. This apparatus will be used to demonstrate a method which can be adopted to manufacture the card.

This method consists firstly in providing a first roll 78, of a first strip 80, whose width is at least equal to one dimension of the card, that is to say its length or breadth. This first strip is made of the material for the card and if the card consists of only a single sheet the thickness of the strip 80 will be the same as the standard thickness of the card.

Whilst the strip 80 is unrolled, a forming device 82 forms a plurality of equally spaced cavities 20 therein. As has been seen, these cavities may be holes or embossed formations. They are represented by broken lines in Fig. 11.

On a different side, a second roll 84 consists of a second sheet 86 which contains a series of devices 22 provided with their arrays 24 of conductors. This strip is in accordance with the British Patent Specifications which were mentioned hereinbefore.

An assembly apparatus 88 cuts (represented by arrow 90) the second strip 86 so as to cut off an element 30 as described above. This apparatus is also responsible for inserting a device 22 into each of the cavities 20 as the strip 80 unrolls, and for joining each element 30 to the strip 80. After strip 80 has been cut as indicated by arrow 92, a card 10 according to the invention finally emerges.

A third roll 94 of a third strip 96 may possibly be used to form the aforementioned cover 40 or 50 by making a cut where indicated by arrow 98 in apparatus 88. The combination of cavity 20, element 30 and cover 40 is schematically illustrated in the card 10 emerging from apparatus 88.

In other cases, the third roll may form the second sheet 64 when the card to be produced is of the type illustrated in Fig. 6.

It should of course be mentioned that apparatus 88 may equally well employ both bonding and welding to join together the constituent parts of the card, as was stated above.

It is a fact that, in view of the small extent of the element 30 and/or the cover 40 or 50 in comparison with the card 10, it can effectively be welded by its edges using conventional and proven welding techniques, such as high frequency welding, which is not true for the welding of large surfaces which occupy for example substantially the whole area of the card, by these same techniques. This one of the major advantages which the invention has over the prior art.

The invention is not of course in any way limited to the embodiments described and illustrated, which have been given merely by way of example, but embraces all means forming technical equivalents of the means described, and combinations thereof, if these are employed in accordance with its general purport and are made use of within the context of the following claims.

WHAT WE CLAIM IS:—

1. An information card comprising: a sheet having a predetermined surface area and a predetermined maximum thickness; an electronic assembly comprising a substrate having a surface area and a thickness smaller than said predetermined surface area and said predetermined maximum thickness of said sheet, respectively, and an electronic device for processing electrical signals carried on at least one major surface of said substrate, said electronic device having a plurality of terminals on a predetermined major surface area and an array of conductors which extend from said terminals toward terminal areas adjacent the peripheral portion of said substrate and which are connected with respective terminal areas; said sheet including a cavity of an area substantially greater than said predetermined major surface area of said electronic device for said substrate with said electronic device and said array of conductors, said cavity including a chamber for said device; said substrate being disposed against one face of said sheet and said card having aperture means adjacent said chamber for access to said respective terminal areas.

2. A card according to claim 1, wherein said sheet has a first general thickness smaller than said maximum thickness and a protuberance, said cavity being disposed in the protuberance of said sheet which culminates at a level such that the total thickness of the sheet and protuberance is at most equal to said maximum predetermined thickness.

3. A card according to claim 2, wherein said protuberance is an embossed formation from a portion of said sheet and having a thickness substantially equal to said thickness of said sheet.

4. A card according to claim 2 or 3, wherein said protuberance is formed by a cap covering said sheet and said substrate.

5. A card according to anyone of claims 1 to 5, wherein said cavity is a hole passing through said sheet and having closure means fixed to said sheet.

6. A card according to anyone of claims 1 to 5, wherein said cavity comprises a first shallow depression adjacent said chamber and on one face of said sheet and having an area for receiving said substrate.

7. A card according to claim 6, wherein the periphery of said substrate is fixed within said first shallow depression of said sheet.

8. A card according to anyone of claims 1 to 7, including sealing cover means overlying said substrate for maintaining said substrate in said cavity, the periphery of said sealing cover means being fixed to said sheet.

9. A card according to claim 8, wherein said sealing cover means comprises a cover having a greater area than that of said substrate and received in a second shallow depression extending from said first shallow depression means.

10. A card according to claim 8 wherein said sealing cover means is an additional sheet extending over said predetermined surface area of said sheet and bonded thereto.

11. A card according to claim 8, wherein said sheet has a first general thickness smaller than said maximum thickness and said sealing cover means is a cap shaped for enclosing said electronic device and culminating at a level such that the total thickness of the sheet and cap enclosed electronic device is almost equal to said maximum thickness.

12. A card according to claim 8, wherein said sheet has a first general thickness smaller than said maximum thickness and said sealing cover means is a substantially plane cover disposed such that the total thickness of the sheet and plane cover is at most equal to said maximum thickness.

13. A card according to claim 8, wherein said sealing cover means is made of a material stiffer than the substrate.

14. A card according to anyone of claims 1 to 13, wherein said aperture means extend through said sheet.

15. A card according to anyone of claims 1 to 14, wherein said aperture means are provided through said sealing cover means.

16. A card according to claim 14 or 15, wherein said aperture means are filled with an electrically conductive material.

17. A card according to anyone of claims 14, 15 and 16, wherein said aperture means

includes a plurality of apertures and each of said terminal areas of said conductors on said substrate is coupled to at least two apertures of said aperture means.

18. A card according to claim 17, wherein each of said terminals of said electronic device is coupled to two separated adjacent conductors of said array of conductors, said two separated conductors ending by two separated adjacent terminal areas, and said coupled apertures are adjacent and opened into one face of said card while respectively corresponding to said separated adjacent terminal areas.

19. A card according to any one of claims 1 to 18, wherein said sheet is a flexible material and said cavity is arranged adjacent a corner of said card for reducing stresses applied to said substrate together with said electronic device and said array of conductors when the sheet is handled.

20. A card according to any one of the preceding claims wherein said electronic device which carries said terminals has a substance which cannot be removed from the device without impairing the operation of said device.

21. A method of producing a card according to any one of the preceding claims, comprising: providing a sheet having a cavity; providing a circuit assembly including a substrate, an array of conductors on the substrate and at least a signal processing device connected to said conductors; inserting said device in said cavity and attaching said assembly to said sheet.

22. A method according to claim 21, wherein said sheet is cut from a first strip, and the cavity then formed therein.

23. A method according to claims 21 or 22, wherein said circuit assembly is cut from a second strip.

24. A method according to claim 23, further including the steps of providing a third strip, cutting a cap or cover section from the third strip and covering said assembly with one of said cap or cover section.

25. A method as claimed in claim 24, wherein the first, second and third strips are each mounted on a roll, and a series of said sheets, a series of said circuit assemblies and a series of said cap or cover sections are successively cut from said strips.

26. An information card substantially as hereinbefore described with reference to Figures 1 and 2 of the accompanying drawings.

27. An information card substantially as hereinbefore described with reference to Figure 3 or Figures 4 and 5 of the accompanying drawings.

28. An information card substantially as hereinbefore described with reference to Figures 6 or 7 of the accompanying drawings.

29. An information card as claimed in any one of claims 26 to 28 and having contact terminals substantially as hereinbefore described in either Figures 8*a* and 8*b* or Figures 9*a* and 9*b*, or Figure 10 of the accompanying drawings.

30. A method of producing an information card substantially as hereinbefore described with reference to Figure 11 of the accompanying drawings.

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1567784 COMPLETE SPECIFICATION
3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*
Sheet 1

Fig. 1.

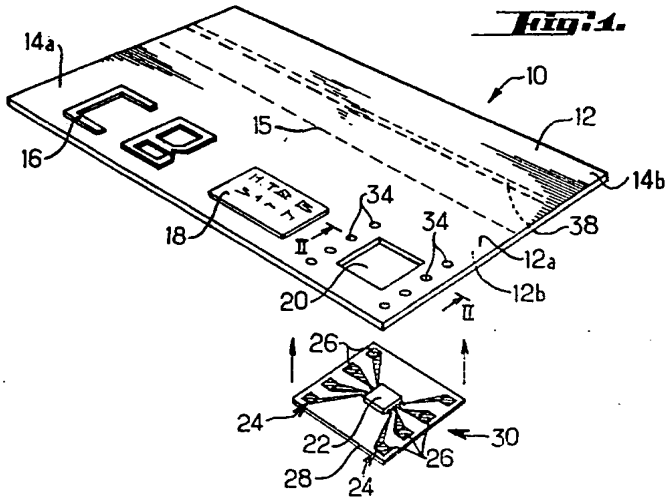


Fig. 2.

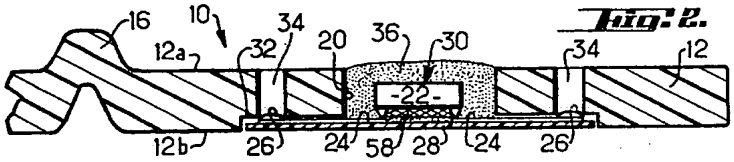


Fig. 3.

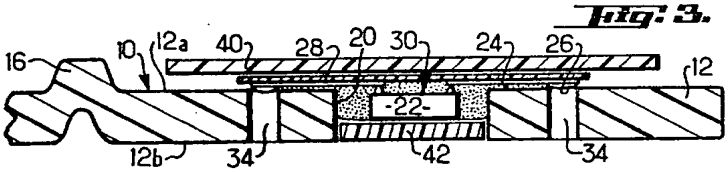
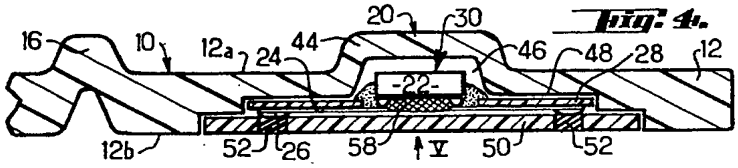


Fig. 4.



1567784 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 2

Fig: 5.

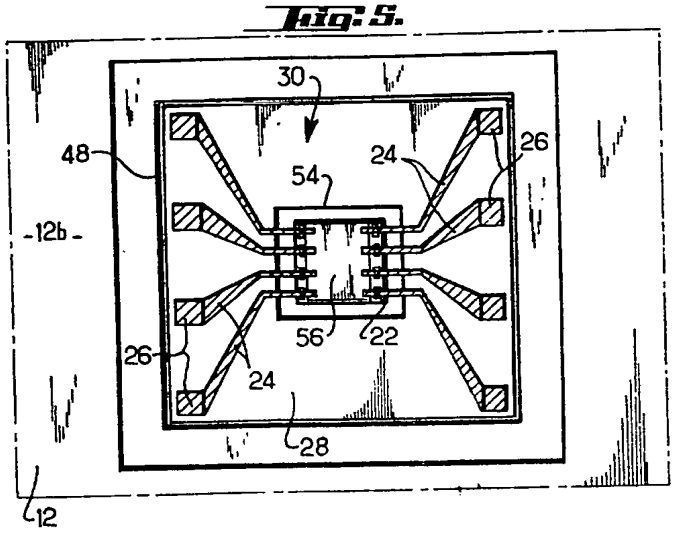


Fig: 6.

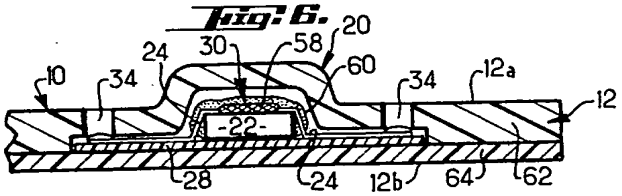
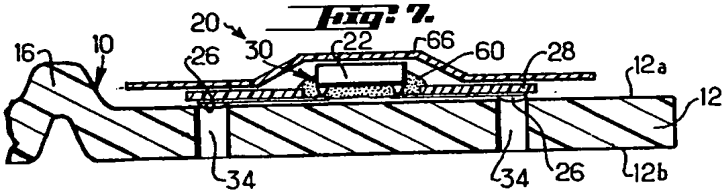


Fig: 7.



1567784 COMPLETE SPECIFICATION

3 SHEETS *This drawing is a reproduction of the Original on a reduced scale*

Sheet 3

Fig:8a.

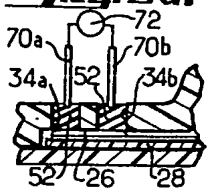


Fig:8b.

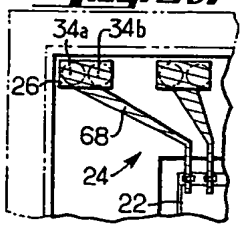


Fig:9a.

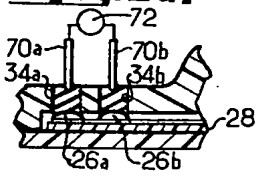


Fig:9b.

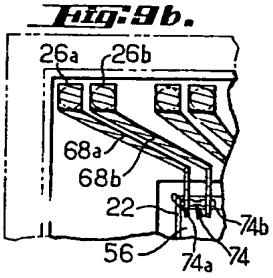


Fig:10.

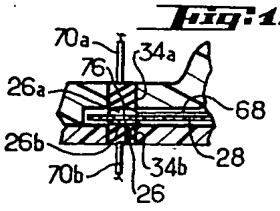


Fig:11.